Random Variables, and properties of their expected values and Standard errors.

X is a random variable and we can specify its distribution. (table)

$$E(X) = \sum_{R} R \cdot P(X = R)$$

$$SE(X) = \sqrt{E\left((X - E(X))^2\right)}$$

Properties of Expectation and Standard Error

1) For some constant c

$$E(c) = c$$

$$SE(c) = 0$$

2) $E(X+c) = E(X)+c$

$$SE(X+c) = SE(X)$$

3) $E(cX) = cE(X)$

$$SE(cX) = |c|SE(X).$$

4) $E(X+Y) = E(X) + E(Y)$

$$E\left(\sum_{i=1}^{n} X_i\right) = \sum_{i=1}^{n} E(X_i)$$

Require X is ind. of Y

for

$$SE(X+Y) = \sqrt{(SE(X))^2 + (SE(Y))^2}$$

$$SE\left(\sum_{i=1}^{n} X_i\right) = \sqrt{\sum_{i=1}^{n} (se(X_i))^2}$$

If we denote

$$S_n = \sum_{i=1}^{n} X_i$$

Same expected value and SE

$$E(S_n) = n E(X)$$

$$SE(S_n) = \sqrt{n} \, SE(X)$$

These are the same
as the box model formulas.

As before we can easily
make the single draw
from a box into a r.v.